

CLAIMS

1. A receiver for a communication system including a plurality of base stations and a plurality of receivers, each base station transmitting a respective CDMA signal including data intended for each of a set of one or more of the receivers, the data intended for each of the receivers being encoded in the CDMA signal using a respective spreading code for that receiver;

the receiver including:

reception means for receiving a signal including CDMA signals;

- 10 one or more branch processing means, the reception means being capable of transmitting the received signal to the or each branch processing means, the or each branch processing means corresponding to a respective one of the base stations and arranged to modify the received signal by the operations of:

- 15 (i) data equalisation, based on a respective filter using a respective set of weights; and

- (ii) decoding the spreading code for the receiver;

- 20 decision means for using the output of the or each branch processing means to generate an error signal and an estimate of the data in the received signal intended for the receiver; and

adaptation means for modifying the or each set of weights using the error signal.

2. A receiver according to claim 1 for use in a communications system in which the CDMA signal transmitted by each base station is encoded using a

respective scrambling code for that base station, and said decoding uses the scrambling code of the corresponding base station.

3. A receiver according to claim 1 or claim 2 in which there are at least two said branch processing means;

5 said decision means combining the outputs of the at least two branch processing means to generate a combined signal, and using the combined signal to generate the error signal and the estimate of the data in the received signal intended for the receiver.

4. A receiver according to claim 3 when dependent on claim 2, adapted to
10 receive CDMA signals with a processing gain of N;

said reception means generating G measurements in each chip duration of the CDMA signal, where G is an integer;

each said set of weights consisting of $G(2M+1)$ weights, where M is an integer;

15 said combined signal being a sum over the branch processing means of the product of (i) a vector derived from said spreading code for the receiver and the scrambling code of the corresponding base station; (ii) a data matrix composed of said measurements and having $G(2M+1) \times N$ components; and (iii) the set of weights for that branch processing means.

20 5. A receiver according to claim 3 or claim 4 in which the detection means is arranged to generate said error signal as the difference between said combined signal and a correction signal.

6. A receiver according to claim 5 in which said detection means includes a non-linear function unit for generating said correction signal from said
25 combined signal using a non-linear function.

7. A receiver according to claim 5 in which the detection means includes a training sequence input for receiving a training sequence, and a switch for selectively deriving said correction signal as a signal input to said training sequence input or the output of the decision means.

- 5 8. A method of extracting data intended for a first user from one or more CDMA signals, each broadcast by a respective base station,

the or each CDMA signal including data intended for the first user and data intended one or more other users, the data for each user being encoded using a respective spreading code;

- 10 the method including:

receiving a signal including the CDMA signals;

transmitting the received signal along one or more processing branches corresponding to different respective said base stations;

- 15 in the or each branch modifying the received signal by the operations of:

(i) data equalisation in respect of the corresponding base station, based on a respective set of weights; and

(ii) decoding, using the spreading code for the first user;

- 20 generating from the outputs of the or each branch an output signal, and using the output signal to derive an error signal, and an estimate signal indicative of the data in the received signal intended for the first user; and

modifying said sets of weights using the error signal.

9. A method according to claim 8 in which the CDMA signal transmitted by each base station is encoded using a scrambling code for that base

station, and said decoding uses using the scrambling code of the corresponding base station.

10. A method according to claim 8 or claim 9 in which the received signal is transmitted along at least two said branches;

5 said decision means combining the outputs of the at least two branches to generate a combined signal, and using the combined signal to generate the error signal and the estimate of the data in the received signal intended for the receiver.

11. A method according to claim 10 when dependent on claim 9 in which
10 said CDMA signals have a processing gain of N;

said step of receiving a signal includes generating G measurements in each chip duration of the CDMA signal, where G is an integer;

each said set of weights consists of $G(2M+1)$ weights, where M is an integer; and

15 said combined signal is a sum over the branches of the product of (i) a vector derived from said spreading code for the first user and the scrambling code of the corresponding base station; (ii) a data matrix composed of said measurements and having $G(2M+1) \times N$ components; and (iii) the set of weights for that branch.

20 12. A method according to claim 10 or 11 in which said error signal is the difference between said combined signal and a correction signal.

13. A method according to claim 12 further including generating said correction signal from said combined signal using a non-linear function.

14. A method according to claim 12 further including deriving said correction signal as a selection from an input training sequence or the estimate signal.

15. A communication system including a plurality of base stations and a plurality of receivers, each base station being arranged to transmit a respective CDMA signal including data intended for each of a set of one or more of the receivers encoded using a respective spreading code for the respective receiver;

each receiver including:

- 10 reception means for receiving a signal including CDMA signals;

one or more branch processing means, the reception means transmitting the received signal to the or each branch processing means, the or each branch processing means corresponding to a respective one of the base stations and arranged to modify the received signal by the operations of:

- 15 (i) data equalisation, based on a respective set of weights; and
(ii) decoding, using the spreading code for that receiver;

decision means for using output of the or each branch means to derive an error signal and an estimate of the data in the received signal intended for that receiver; and

- 20 adaptation means for modifying said sets of weights using the error signal.